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09/909,394	07/19/2001	Gang Huang	HUANG 11-1-10	9912

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EXAMINER	
PATHAK, SUDHANSHU C	
ART UNIT	**PAPER NUMBER**
2611	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 09/909,394	Applicant(s) HUANG ET AL.	
	Examiner Sudhanshu C. Pathak	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *March 12th, 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *Feb. 24th, 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-21 are pending in the application.

(The claims considered in the instant office action, are as faxed to the examiner on March 20th, 2007), as per the interview with the examiner on March 19th, 2007.

Response to Arguments

2. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 6 (system) & 8, 10, 13 (method), are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant Admitted Prior Art (AAPA) in view of Nakamura et al. (6,853,631) in further view of Alelyunas et al. (6,553,087).

Regarding to Claims 1, 3, 8 & 10, The Applicant Admitted Prior Art (AAPA) discloses a communication system comprising a zero-amplitude symbol constitutes an end-of-file symbol or separate subframes according to a Home Phoneline Networking Alliance (HomePNA) standard using quadrature amplitude modulation (QAM) technique to more efficiently transfer the information across the network

(Specification, Page 1, Paragraph 2, lines 1-10 & Specification, Page 2, Paragraphs 3-4). However, the AAPA does not explicitly disclose a QAM constellation comprising a zero amplitude symbol, said zero-amplitude symbol interrupting a regular rectangular array of said constellation of symbols, wherein ideal symbols of said regular rectangular array are substantially equidistant to each other and further and zero-amplitude symbol interpreter, that recognizes said candidate symbol as being a zero-amplitude symbol when said candidate symbol is closer to an origin of said constellation than to symbols proximate thereto.

Nakamura discloses a system of transmitting data through a communication channels implementing a QAM modulation techniques (Column 3, lines 34-39 & Fig. 3). Nakamura also discloses a QAM constellation, arranged on a cartesian plane, comprising a zero amplitude symbol, said zero-amplitude symbol interrupting a regular rectangular array of said constellation of symbols, wherein ideal symbols of said regular rectangular array are substantially equidistant to each other (Fig. 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Nakamura teaches implementing a QAM signal (constellation) comprising a zero-amplitude symbol at the origin of the constellation, said zero-amplitude symbol interrupting a regular rectangular array of said constellation of symbols, wherein ideal symbols of said regular rectangular array are substantially equidistant to each other, and this can be implemented in the system as described in the AAPA so as to represent a certain specified information according to the HomePNA standard as further described in the AAPA, thus satisfying the limitation

of the claims. However, the AAPA in view of Nakamura does not disclose zero-amplitude symbol interpreter, that recognizes said candidate symbol as being a zero-amplitude symbol when said candidate symbol is closer to an origin of said constellation than to symbols proximate thereto.

Alelyunas discloses demodulation of communications signals for a packet data receiver (Column 1, lines 15-20, 50-63 & Fig. 1, elements 102-106). Alelyunas also discloses the receiver to include a slicer <u>(interpreter)</u>, that chooses from set of possible valid receivable levels which most closely matches the current received signal level and a decoder that converts this selected constellation point to a set of bits in a bit stream (Column 3, lines 25-45 & Fig. 2, elements 220, 222) {Interpretation: Alelyunas discloses the network implementing the HPNA standard. Furthermore, if the candidate symbol is closer to the origin and the constellation comprises a (reference) symbol at the origin, then that reference symbol will be selected as the received symbol. <u>Furthermore, it is notoriously known to one of ordinary skill in the art that a slicer comprising a reference constellation comprises a zone i.e. decision zone (regions), having boundary formed by a set of points that are equidistant from the reference symbol, so as to determine the candidate symbol</u>[1]}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Alelyunas teaches mapping the received signals on an known constellation in the slicer (interpreter) and selecting the constellation point most close to the received signal level and further converting the selected constellation

point into a set of bits, this can be implemented in the system as described in the AAPA in view of Nakamura so as to determine the zero amplitude symbol and further this symbol is converted into a bits stream which is interpreted as "end-of-file" or "end-of-subframe" in the HomePNA standard.

Regarding to Claims 6 & 13, the AAPA in view of Nakamura in further view of Alelyunas discloses a system for recognizing zero amplitude symbols in a quadrature amplitude signal comprising an interpreter that recognizes a candidate symbol as being zero amplitude symbol based on when the candidate symbol is closer to the origin of the constellation than to symbols proximate thereto as described above. Nakamura further discloses the constellation is arranged on a Cartesian plane (Fig. 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that AAPA in view of Nakamura in further view of Alelyunas satisfies the limitations of the claims.

5. Claims 2, 4-5, 7 (system) & 9, 11-12, 14 (method) are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant Admitted Prior Art (AAPA) in view of Nakamura et al. (6,853,631) in further view of Alelyunas et al. (6,553,087) in further view of Koslov (5,471,508).

Regarding to Claims 2, 4, 7, 9, 11 & 14, the AAPA in view of Nakamura in further view of Alelyunas discloses a system for recognizing zero amplitude symbols in a quadrature amplitude signal comprising an interpreter that recognizes a candidate symbol as being zero amplitude symbol based on when the candidate symbol is

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[1] Messerschmitt & Lee; Digital Communications; Copyright 1988 by Kluwer Academic Publishers; Pages

closer to the origin of the constellation than to symbols proximate thereto as described above. However, the AAPA in view of Nakamura in further view of Alelyunas does not disclose the interpreter determines said candidate symbol is closer to the origin than to the symbol proximate thereto when a sum of an absolute value of the in-phase and quadrature coordinates of said candidate symbol is less than one (linear algorithm).

Koslov discloses a QAM receiver comprising a QAM detector used to detect the particular type of QAM signal being received and further demodulating the received signal (Column 5, lines 15-20 & Column 6, lines 25-40 & Column 8, lines 20-65). Koslov further discloses the QAM receiver to further comprise a slicer wherein the received signal is mapped to a corresponding reference constellation so as to determined the received symbol (Column 11, lines 29-42). Koslov further discloses the slicer determines the candidate symbol by determining the sum of an absolute value of the in-phase and quadrature coordinates of said candidate symbol (linear algorithm) (Column 14, lines 15-62 & Fig.'s 4A-4B) {Interpretation: Koslov determines the candidate symbols by mapping the candidate symbol to the reference constellation. This is done by sensing the sign of the in-phase and quadrature components to determine the quadrant of the received symbol, and then determining the magnitude "R" of the received symbol, which is the sum of an absolute value of the in-phase and quadrature components of said candidate symbol and then mapping the candidate symbol. This computation is the linear algorithm}.

152-153 (Sec. 6.1.3, Example 6-8) & Page 186-189 (Sec. 6.5, Fig. 6-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Koslov teaches the slicer determines the candidate symbol by determining the sum of an absolute value of the in-phase and quadrature components of said candidate symbol, and this can be implemented in the slicer as described in the AAPA in view of Nakamura in further view of Alelyunas so as to then map the candidate symbol on the reference constellation and accurately determine the constellation of the received signal and the candidate symbol in the representative constellation. Furthermore, Koslov teaches implementing the linear algorithm to compute the magnitude of the candidate symbol, thus it does not employ a slicer table. There is no criticality in employing the slicer table, this is a matter of design choice.

Regarding to Claims 5 & 12, the AAPA in view of Nakamura in further view of Alelyunas discloses a system for recognizing zero amplitude symbols in a quadrature amplitude signal comprising an interpreter that recognizes a candidate symbol as being zero amplitude symbol based on when the candidate symbol is closer to the origin of the constellation than to symbols proximate thereto as described above. However, the AAPA in view of Nakamura in further view of Alelyunas does not explicitly disclose the symbols proximate the origin are located at relative amplitudes of: (1,1), (1, -1), (-1, 1), (-1, -1).

Koslov discloses a QAM receiver comprising a QAM detector used to detect the particular type of QAM signal being received and further demodulating the received signal (Column 5, lines 15-20 & Column 6, lines 25-40 & Column 8, lines 20-65).

Koslov further discloses the QAM receiver to further comprise a slicer wherein the received signal is mapped to a corresponding reference constellation so as to determined the received symbol (Column 11, lines 29-42). Koslov further discloses the symbols proximate the origin are located at relative amplitudes of: (1,1), (1, -1), (-1, 1), (-1, -1) (Fig. 4A-4B & Column 14, lines 23-26, 46-49) {Interpretation: It is also inherent in QAM constellations to have symbols proximate the origin are located at relative amplitudes of: (1,1), (1, -1), (-1, 1), (-1, -1)}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that AAPA in view of Nakamura in further view of Alelyunas in further view of Koslov satisfies the limitations of the claims.

6. Claims 15, 17, 20 (receiver) are rejected under 35 U.S.C. 103(a) as being unpatentable over Alelyunas et al. (6,553,087) in view of Rappaport ("Principles and Practice"; Prentice Hall PTR; 1996; Pages 270-272) in further view of the Applicant Admitted Prior Art (AAPA) in further view of Nakamura et al. (6,853,631).

Regarding to Claims 15, 17, 20, Alelyunas discloses a digital receiver comprising an A/D converter that converts a received signal analog form to digital form (Fig. 2, element 214); a demodulator, coupled to said A/D converter, that demodulates said digital signal (Fig. 2, element 216); an equalizer, coupled to said demodulator, that equalizes said digital signal (Fig. 2, element 218); a slicer, coupled to said equalizer, that recognizes and chooses from a set of possible valid receivable levels a level, or "point"; which most closely matches the current received signal level (Fig. 2, element

220); and a decoder converts this selected point to a set of bits in a bit stream depending on the protocol (inverse of the encoder) (Fig. 2, element 222). Alelyunas also discloses implementing the receiver in a HPNA (Home Phoneline Network Alliance) standard (Column 1, lines 48-65). Alelyunas also discloses the receiver to include a slicer, that chooses from set of possible valid receivable levels which most closely matches the current received signal level and a decoder that converts this selected constellation point to a set of bits in a bit stream (Column 3, lines 25-45 & Fig. 2, elements 220, 222). However, the Alelyunas does not disclose an amplitude detector.

Rappaport discloses QAM signal to include a combination of amplitude modulation and phase modulation (Page 270, Sec. 5.9.2, Eq. 5.120). Rappaport also discloses each point on the constellation in QAM to be an integral multiple of the minimum energy required for transmission (Page 270, Sec. 5.9.2, elements "E_{min}", "a_i", "b_i" & Page 271, Eq. 5.123). Rappaport also discloses the phase modulation in a QAM to be portioned into sine and cosine functions (Page 271, Eq. 5.121, 5.122). Therefore, it would have been obvious to one of ordinary skill in the art a the time of the invention that to decode the QAM requites amplitude detection of the in-phase and quadrature components, and this can be implemented in the receiver prior to the slicer so as to determine the corresponding point on the constellation depending on the received signal. However, Alelyunas in view of Rappaport does not disclose transmitting/receiving a QAM signal further comprising a zero-amplitude symbol so as to represent an "end -of- file" or for separating

subframes according to the "HPNA" standard, and further a decoder for a zero amplitude symbol.

The Applicant Admitted Prior Art (AAPA) discloses a communication system comprising a zero-amplitude symbol constitutes an end-of-file symbol or separate subframes according to a Home Phoneline Networking Alliance standard using quadrature amplitude modulation (QAM) technique to more efficiently transfer the information across the network (Specification, Page 1, Paragraph 2, lines 1-10 & Specification, Page 2, Paragraphs 3-4). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention that the AAPA teaches "HPNA" standard to have a symbol to represent an "end-of-file" or an "end-of-subframe" condition, and this can be transmitted in the transceiver as describe in Alelyunas in view of Rappaport. However, Alelyunas in view of Rappaport in further view of AAPA does not disclose a QAM constellation comprising a zero amplitude symbol.

Nakamura discloses a system of transmitting data through a communication channels implementing a QAM modulation techniques (Column 3, lines 34-39 & Fig. 3). Nakamura also discloses a QAM constellation, arranged on a cartesian plane, comprising a zero amplitude symbol, said zero-amplitude symbol interrupting a regular rectangular array of said constellation of symbols, wherein ideal symbols of said regular rectangular array are substantially equidistant to each other (Fig. 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Nakamura teaches implementing a QAM comprising a zero-

amplitude symbol at the origin of the constellation, and this can be implemented in the system as described in Alelyunas in view of Rappaport in further view of AAPA so as to represent a certain specified information according to the HomePNA standard as further described in the Alelyunas in view of Rappaport in further view AAPA, thus satisfying the limitation of the claims. Furthermore, it is known to one of ordinary skill in the art at the time of the invention that a 16-QAM constellation is arranged on a Cartesian plane.

7. Claims 16, 18-19 & 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alelyunas et al. (6,553,087) in view of Rappaport ("Principles and Practice"; Prentice Hall PTR; 1996; Pages 270-272) in further view of the Applicant Admitted Prior Art (AAPA) in further view of Nakamura et al. (6,853,631) in further view of Koslov (5,471,508).

Regarding to Claims 16 & 21, Alelyunas in view of Rappaport in further view of AAPA in further view of Nakamura discloses a digital receiver comprising a DAC; a demodulator; an equalizer; a slicer; an amplitude detector; a zero-amplitude symbol interpreter and a decoder as described above. However, Alelyunas in view of Rappaport in further view of AAPA in further view of Nakamura does not disclose the interpreter determines said candidate symbol is closer to the origin than to the symbol proximate thereto when a sum of an absolute value of the in-phase and quadrature coordinates of said candidate symbol is less than one (linear algorithm).

Koslov discloses a QAM receiver comprising a QAM detector used to detect the particular type of QAM signal being received and further demodulating the received

signal (Column 5, lines 15-20 & Column 6, lines 25-40 & Column 8, lines 20-65). Koslov further discloses the QAM receiver to further comprise a slicer wherein the received signal is mapped to a corresponding reference constellation so as to determined the received symbol (Column 11, lines 29-42). Koslov further discloses the slicer determines the candidate symbol by determining the sum of an absolute value of the in-phase and quadrature coordinates of said candidate symbol (linear algorithm) (Column 14, lines 15-62 & Fig.'s 4A-4B) {Interpretation: Koslov determines the candidate symbols by mapping the candidate symbol to the reference constellation. This is done by sensing the sign of the in-phase and quadrature components to determine the quadrant of the received symbol, and then determining the magnitude "R" of the received symbol, which is the sum of an absolute value of the in-phase and quadrature components of said candidate symbol and then mapping the candidate symbol. This computation is the linear algorithm}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Koslov teaches the slicer determines the candidate symbol by determining the sum of an absolute value of the in-phase and quadrature components of said candidate symbol, and this can be implemented in the slicer as described in the Alelyunas in view of Rappaport in further view of AAPA in further view of Nakamura so as to then map the candidate symbol on the reference constellation and accurately determine the constellation of the received signal and the candidate symbol in the representative constellation. Furthermore, Koslov teaches implementing the linear algorithm to compute the magnitude of the

candidate symbol, thus it does not employ a slicer table. There is no criticality in employing the slicer table; this is a matter of design choice.

Regarding to Claims 18-19, Alelyunas in view of Rappaport in further view of AAPA in further view of Nakamura discloses a digital receiver comprising a DAC; a demodulator; an equalizer; a slicer; an amplitude detector; a zero-amplitude symbol interpreter and a decoder as described above. However, Alelyunas in view of Rappaport in further view of AAPA in further view of Nakamura does not explicitly disclose the symbols proximate the origin are located at relative amplitudes of: (1,1), (1, -1), (-1, 1), (-1, -1).

Koslov discloses a QAM receiver comprising a QAM detector used to detect the particular type of QAM signal being received and further demodulating the received signal (Column 5, lines 15-20 & Column 6, lines 25-40 & Column 8, lines 20-65). Koslov further discloses the QAM receiver to further comprise a slicer wherein the received signal is mapped to a corresponding reference constellation so as to determined the received symbol (Column 11, lines 29-42). Koslov further discloses the symbols proximate the origin are located at relative amplitudes of: (1,1), (1, -1), (-1, 1), (-1, -1) (Fig. 4A-4B & Column 14, lines 23-26, 46-49) {Interpretation: It is also inherent in QAM constellations to have symbols proximate the origin are located at relative amplitudes of: (1,1), (1, -1), (-1, 1), (-1, -1)}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that AAPA in view of Nakamura in further view of Alelyunas in further view of Koslov satisfies the limitations of the claims.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhanshu C. Pathak whose telephone number is (571)-272-3038. The examiner can normally be reached on M-F: 9am-6pm.

- If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571)-272-3042
- The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

- Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sudhanshu C. Pathak

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER